

Structural Repairs

Presented by

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Presenter Bio: Rick Abbott

- Born in Minnesota in 1966 (Snow, Ice, Lakes)
- BS Civil Engineering – University of MN 1989
- Masters of Engineering (Civil) – Cornell 1990
- Professional Engineer (PE) in 1993
- Structural Engineer (SE) in 2003
 - 1 construction material testing
 - 19 years structural design
 - Licensed PE in 7 states
 - Licensed SE California
- Forensic Engineering in 2011
 - 10 years of inspecting distressed buildings
 - Report writing
 - A lot of time with eye on crazy stuff.

What is PE vs SE

<https://abbottforensic.com/what-is-a-structural-engineer/>

Frequent Asked Questions

<https://abbottforensic.com/faq/>

White Papers

<https://abbottforensic.com/white-papers/>

Forensic Engineer

<https://abbottforensic.com/what-is-a-forensic-structural-engineer/>

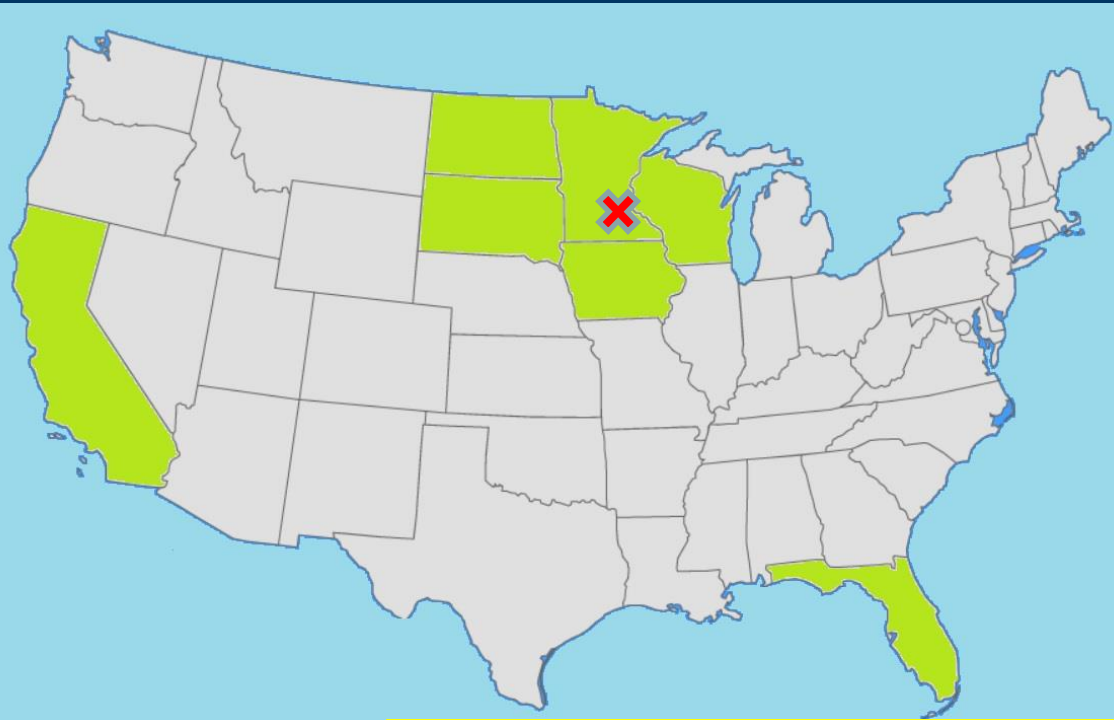
Seminars

<https://abbottforensic.com/seminars/>



Presenter Bio: Rick Abbott

The home office is in Minneapolis / St. Paul Area



Scope of Work:
What went wrong?
What is the Extent of Damage?
Offer Repair Recommendations

Online



Structural Repairs - Agenda

1. Types of Construction
2. Code Discussion
3. Snow Load Example
4. Structural Member Design
5. Definition of Damage
6. The Repair Team
7. Exterior Wood Deck Example
8. 20 Steps of the Repair Process



Questions?

As we go



Lesson 1

Types of Construction

What are the types of construction?



Types of Construction

1. New Construction
2. Repairs
3. Renovations
4. Alterations
5. Reconstructions



IRC Appendix J

Existing Buildings and Structures

“all work in existing buildings shall be classified into the categories”

- Repairs
- Renovations
- Alterations
- Reconstructions



Repairs Section AJ301

REPAIR. The patching, restoration and/or minor replacement of materials, elements, components, equipment and/or fixtures for the purposes of maintaining those materials, elements, components, equipment and/or fixtures in good or sound condition.



Repairs Section AJ301

AJ301.1 Materials.

- Except as otherwise required herein, work shall be done using like materials or materials permitted by this code for new construction.



Renovations - Section AJ401

RENOVATION.

The change, strengthening or addition of load-bearing elements; and/or the refinishing, replacement, bracing, strengthening, upgrading or extensive repair of existing materials, elements, components, equipment and/or fixtures. Renovation involves no reconfiguration of spaces.



Renovations - Section AJ401

AJ401.1 **Materials and methods.**

- The work **shall comply with** the materials and methods requirements of **this code.**



Alterations - Section AJ401, AJ501

ALTERATION.

The **reconfiguration of any space**; the addition or elimination of any door or window; the reconfiguration or extension of any system; or the installation of any additional equipment.



Alterations - Section AJ401, AJ501

AJ501.4 Structural.

The minimum design loads for the structure shall be the loads applicable at the time the building was constructed, provided that no dangerous condition is created. **Structural elements that are** uncovered during the course of the alteration and that are found to be **unsound or dangerous** shall be made to comply with the applicable requirements of this code.



IRC Appendix J

DANGEROUS. Where the stresses in any member; the condition of the building, or any of its components or elements or attachments; or other condition that results in an **overload exceeding 150%** of the stress allowed for the member or material in this code.



Reconstructions

Section AJ401, AJ501, AJ601

RECONSTRUCTION. The reconfiguration of a space that affects an exit, **a renovation and/or alteration when the work area is not permitted to be occupied** because existing means-of-egress and fire protection systems, or their equivalent, are not in place or continuously maintained; and/or there are extensive alterations as defined in Section AJ501.3.



Reconstructions

Section AJ401, AJ501, AJ601

- The materials and methods must comply with code
- Noncompliance shall not be increased or created.
- Unsound or dangerous conditions shall be made to comply with code
- Update stairways, wall finishes, ceiling finishes in work area.



Types of Construction

| | | |
|---------------------|--------------------------------------------------------|---------------------------------------|
| 1. New Construction | Everything is new | Must follow Current Code in every way |
| 2. Repairs | Minor Repairs | Like kind and material |
| 3. Renovations | Extensive Repairs | Replace with Up-to-date material |
| 4. Alterations | Reconfiguration (new window) Taking out a wall | Must use Up-to-date material |
| 5. Reconstruction | Work that prevents people from living in the structure | More like new construction |



Minnesota Conservation Code for Existing Buildings

Adoption of International Existing Building Code

- Repairs
- Alterations
- Additions
- Change of Occupancy
- Historical Buildings
- Relocated Buildings



International Existing Building Code

IEBC

- Repairs Chapter 6
- Alteration – Level 1 Chapter 7
- Alteration – Level 2 Chapter 7, 8
- Alteration – Level 3 Chapter 7, 8, 9
- Change of Occupancy Chapter 10
- Additions Chapter 11
- Historical Building + Chapter 12



| | New | Existing |
|----------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| All Structures | <ul style="list-style-type: none">• International Building Code• IBC | <ul style="list-style-type: none">• International Existing Building Code• IEBC |
| Residential | <ul style="list-style-type: none">• International Residential Code• IRC | <ul style="list-style-type: none">• International Residential Code• IRC App J - Existing Buildings and Structures |



| | New | Existing |
|----------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| All Structures | <ul style="list-style-type: none">• International Building Code• IBC | <ul style="list-style-type: none">• International Existing Building Code• IEBC |
| Residential | <ul style="list-style-type: none">• International Residential Code• IRC | <ul style="list-style-type: none">• Chapter 1309• Sub-Paragraph 2• New work = code• Structural repairs = code <p>https://codes.iccsafe.org/content/MNRC2020P1/2020-minnesota-residential-code#MNRC2020P1_Ch1309_Sec1309.0100</p> |



The Minnesota State Building Code consists of 18 chapters. Most of them adopt by reference a model code or standard that has been developed by a national code-making organization. The remaining chapters contain subject matter that has been written specifically for Minnesota.

1300 – Minnesota Building Code Administration

1303 – Special Provisions

→ 1305 – Minnesota Commercial Building Code

1307 – Elevators and Related Devices

→ 1309 – Minnesota Residential Code

→ 1311 – Minnesota Conservation Code for Existing Buildings

1315 – Minnesota Electrical Code

1322/23 – Minnesota Energy Code

1335 – Flood-proofing Regulations

1341 – Minnesota Accessibility Code

1346 – Minnesota Mechanical and Fuel Gas Code

→ 1350 – Manufactured Homes

1360 – Prefabricated Structures

1361 – Industrialized/Modular Buildings

1370 – Storm Shelters (Manufactured Home Parks)

4714 – Minnesota Plumbing Code

5230 – Minnesota High Pressure Piping Systems



History of
building
requirements

State Statutes

MN Rules

Federal
Regulations

Model Code

Enforcement

<https://www.dli.mn.gov/sites/default/files/pdf/guide-2020.pdf>



Chapter 1300.011

Sub-Paragraph 12

Subp. 12. Modifications.

If there are practical difficulties involved in carrying out the provisions of the code, the building official may grant modifications for individual cases, upon application by the owner or owner's representative, provided the building official finds that special individual reason makes the strict letter of the code impractical, the modification is in compliance with the intent and purpose of the code, and the modification does not lessen health, life, and fire safety or structural requirements. The details of action granting modifications shall be recorded and entered in the files of the Department of Building Safety.

https://codes.iccsafe.org/content/MNRC2020P1/2020-minnesota-building-code-administration#MNRC2020P1_Ch1300_Sec1300.0110

